Would you know Nova Scotia's wealth from a hole in the ground?

Nova Scotia Department of Natural Resources
Mineral Resources Branch
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Geology

All the minerals the world will ever have are already in the ground. How did they get there? and when?

Hot Rock!

Draw a line from Cobequid Bay to Chedabucto Bay; geology in the province divides north and south of it. The oldest rocks - in northwest Cape Breton - are over a billion years old. Awesome! No rocks from this period are found in the south. Volcanoes erupted and forced granite into these pre-historic rocks, forming deposits of copper, lead, zinc and gold.

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Driftin'

For about 200 million years the continents drifted, crashed into each other, buckled and folded. North America smashed into North Africa as a drifting supercontinent was formed south of the equator. Rocks melted and formed deposits in southern Nova Scotia, such as the gold in Mooseland and around Sherbrooke and the tin now being mined in Yarmouth County. The sea flooded low areas and as the super-continent drifted toward the equator, the climate became drier. When the seas evaporated, limestone, salt, gypsum and anhydrite deposits formed in areas along the Minas Basin, Strait of Northumberland and in Cape Breton. As the supercontinent drifted further north the climate became cooler and wetter and swamps resulted. The animals, insects and plants living in the swamps decayed to form coal, in areas around Joggins, Kemptown-Debert, Pictou, Richmond County and Sydney.

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Riftin'

Just over 200 million years ago the super-continent began breaking apart, rifting, along the dividing line form Cobequid to Chedabucto. The rocks to the south are like those found in Morocco and are the only such rocks in North America. Later, the African part broke away along the Continental Shelf. Fold a cheese slice some time; watch how the break forms a jagged edge. That's how the rifting happened.

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Rolling Stones!

Later, four ice sheets affect Nova Scotia, pushing rocks ahead of them and dragging them along underneath. The result? The sand, gravel and other aggregates used for construction today. As the ice sheets melted, the seas rose and formed the many deep inlets and harbours that the province depends on for fishing, recreation and exports.

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So what?

So geological maps. Geologists study the surface deposits for traces of minerals and to find out which way they travelled with the ice so they can track the minerals back to their source. They also study the bedrock underneath for deposits. If they find minerals in certain rock formations and know the age of the rocks, they know to look in areas with similar conditions for other mineral deposits. They map the bedrock and the surface deposits and share the

information with mining companies, making the search for mineral wealth much less of a guessing game. And the geology helps to explain Nova Scotia's mineral wealth: great variety in a small area.

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Mineral Industry

Top four on the charts!

In 1720, the workers building Fort Louisbourg needed fuel: Cape Breton's coal was the answer. Local farmers were quarrying gypsum for fertilizer on their own lands in Hants County in the 1770s, taking it by horse and wagon to ports for shipment to the United States. In the mid-1700s, Queen Quarry on the Northwest Arm and Terence Bay supplied granite for building in Halifax, and salt appeared in the early 1800s. These four products - coal, gypsum, structural materials and salt - remain the top four mineral products in volume and value today.

Since the mid-1800s, the government has regulated the mining industry and provided incentives for further exploration and refining of local ores. The Crown retains the rights to all minerals in the province.

Mining has been a major employer, though employment grows and shrinks according to circumstances often not under the control of the industry. World prices and demand rise and fall, competitive products emerge, and mechanization has an impact. Mining has been in the top five in employment and production among the "goods producing" industries for the past 15 years, behind manufacturing and construction. But think of manufacturing and construction without mining. No coal for steel, no tin, zinc or other metallic minerals for manufacturing, no aggregates for building and no gypsum for wallboard. Mining has paid the second highest average weekly wages from 1975 to 1981 and the highest ever since.

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Seeing green

From early days, the rights of landowners have been protected in legislation, and mining companies have had to clean up after the activity ceased. This may have meant simply covering a shaft and putting up a protective barrier. Increased public concern about the environment means that today governments, mining companies and industry associations work together to address these issues. Now companies have to pay money in the form of a bond and undergo an Environmental Assessment Review before the project can begin. Unless they clean up properly and return the land to a useful state, they won't have their bond money refunded. Companies wanting to join the Chamber of Mineral Resources have to sign an agreement to abide by environmental guidelines.

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King Coal

Coal dominates mining in Nova Scotia. It was Canada's first export, when Cape Breton coal was sent to Boston in 1724. Coal mining was the first industry where standards were set for things like equipment, explosives, ventilation and for certification of workers, and to regulate child labour. This was more than 20 years before labour in shops and factories was protected. Coal was of such strategic importance during two World Wars that special measures were taken to increase production. Many commissions and studies have looked into coal mining, and most have recommended that it be shut down rather than continue to drain government subsidies. For political, rather than economic reasons, such recommendations have not been accepted, though the industry has modernized in order to increase productivity. When oil and gas were cheap, coal was not competitive; when the prices of oil and gas rose sharply in the 1970s, coal was again needed for generating electricity. When steam railway engines gave way to diesel, the demand for coal dropped. Coal fields may be about to take on a new life. The methane gas that seeps from the fields, under its own pressure, can be trapped and used for fuel. This is being done in the United States. Alberta and Nova Scotia are both looking into it.

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Industry Minerals

Gypsum - the backyard export that grew

The backyard product that was exported for fertilizer more than 200 years ago took on a new life when wallboard was developed after World War II. It was originally shipped in raw form to the United States for processing, and raw gypsum is still the No. 1 commodity shipped through Halifax harbour. But in 1989 an American company set up a processing plant at Point Tupper to make the wallboard and send it by containerized ship to eastern and southern U. S. Ports. Today one house in four in the United States has Nova Scotia gypsum in its wallboard. Have you got it in yours?

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Anhydrite - old product, new use

A sister of gypsum, anhydrite often got in the way of gypsum mining. But recently it has been found useful for making wall packs for mines, to replace the timber. Experiments in the laboratory proved that the province's anhydrite was suitable for this new use, and it is now being tested in a mine at Sydney. It is cheaper, since the timber had to be brought in from New Brunswick, safer, because it is fire-resistant, and it forms a better seal so that the air pumped in from the surface doesn't escape through the walls.

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Salt - Sergeant Pepper, meet Major Salt

Salt production began around Malagash in 1918 when Canada's first underground rock salt mine opened. It closed in the 1950s, but production began at nearby Pugwash and at Nappan in Cumberland County. Different methods are used: at Pugwash the "room and pillar" method extracts the salt and leaves pillars to support the deposits and soil over-head. The rock salt is processed on the surface. At Nappan, water is pumped in to form a brine which is then pumped to the surface for processing. There are over 14,000 uses for salt - in industry, medicine and the home.

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Metallic Minerals

Heavy Metal!

No Diamond Lil's, no honky-tonk piano, but 40 years before the Klondike fired the imagination, Nova Scotia had a **gold** rush. It began in Mooseland in 1860, and within five years, 95 mines had been established. The names of the early companies reflect the eternal search for riches - names like Eldorado and Eureka. They also show the importance of investment from outside the province, with names like Ontario, Montreal, Boston, and Chicago. A second gold rush in 1896 produced even more wealth, but production fell the next year when miners rushed off to the Klondike. But Nova Scotia's gold still glitters; today activity continues at Moose River and near Sherbrooke, site of the largest producing gold field in the province.

Tin wasn't considered seriously for its economic potential until the discovery in Yarmouth County in 1976. Today the Rio Algom mine at East Kemptville is the only primary tin producing mine in North America.

Barite is used as a filler and extender in plastics, rubber and paint. Barite mining continued uninterrupted from 1865 to 1978. The Walton mine in Hants County is the largest known single deposit of barite in the world.

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Aggregates

What kind of history would Nova Scotia have had without sand, gravel and rock to build forts, wharves, roads and homes? The first drydock in Halifax Harbour was built from Mahone Bay sand mixed with concrete. It opened in 1889; it's still in use. Public opposition to "mining" beaches grew in the 1960s, and eventually it was banned entirely. Most of the building material in the province comes from the glacial deposits; some is from crushed stone. The major use is for roads and highways, and the largest single client for the materials is the Department of Transportation and Communications. About 10 per cent of production is exported to the United States, although demand there has grown in the past few years. Export also go to the other Atlantic Provinces and Quebec.

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Mining Returns the Favour

Just as geology helps us to understand where to look for minerals, mining can also help geology. In October of 1989, a bulldozer driver at the gypsum mine in Windsor found a full mastodon tusk in a load of earth he was dumping. The tusk dates from the end of the glacial period, and was covered by some 30 metres of deposits. The animal it belonged to was about three-quarters grown. Except for the mining, the tusk would not likely have been found, though it was no surprise to geologists. Mastodons were known to travel hundreds of miles for salt, just as cows to a salt lick, and the salt is found with the gypsum. The tusk is now drying at the Nova Scotia Museum, and will be on display in 1992.

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Bigger! Deeper! Sooner! Higher! Some Nova Scotia Superlatives

- **Deepest Mine in North America:**
  Number 2 mine at Springhill, where 74 men died on October 23, 1958. It was also the scene of the deepest rescue ever conducted in Canada - down to 3960 metres.

- **Only Primary Tin Mine in North America:**
  Rio Algom mine, at East Kemptville.

- **Largest Known Single Deposit of Barite in the World:**
  the Walton Mine which produced from 1940 to 1978 and was phased out leaving 900 000 tonnes of Barite Underground.

- **Most Dangerous Coal Mine in The World:**
  Allan Shaft, in the Pictou coalfields which experienced two major explosions. One in January, 1918 killed 88 and another in 1929 so completely destroyed the shaft that it took two years to recover the worksite. Fortunately no one was in the shaft at the time.

- **Most Productive Gypsum Mining Region in the World:**
  Nova Scotia, where the Milford mine is the largest gypsum mine in North America.

- **Canada's First Gold Rush:**
  In Mooseland during the 1860s, some thirty years before the Klondike drew prospectors west. The first recognized gold mine in the province was at Tangier which, with Mooseland, was proclaimed an official gold district in May, 1861.

- **First Recorded Export of Minerals from Canada:**
  1724, when coal was exported from Cape Breton to Boston.

- **Canada's First Underground Rock Salt Mine:**
  Malagash, opened in 1918.

- **Largest Tonnage of Any Commodity Shipped Through Halifax Harbour:**
  gypsum, mainly for the United States market, where a quarter of the homes have Nova

Scotia gypsum in their wallboard.

- **First Self-contained Breathing Apparatus for Mine Rescue in North America:** obtained by Glace Bay collieries in 1906.

Photos: (Not presently available)

Cover Photo (no caption) Energy, Mines and Resources Canada

The "Dosco Miner", a self-propelled machine that digs a 5-foot wide slice of coal and loads it on a conveyor belt, without explosives or manual labour. Seen at work in the Lingan Colliery, Sydney (Photo: Energy, Mines and Resources Canada)

First Come, First Served at a gypsum quarry near Chéticamp. (Photo: Nova Scotia Department of Mines and Energy)

The underground salt mine of Canadian Salt Company Ltd. at Pugwash ships to markets by road, rail and water. (Photo: Energy, Mines and Resources Canada)

Map: (Not presently available)

Nova Scotia's mineral deposits - great variety in a small area

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